



**MELTON MOWBRAY  
URBAN DISTRICT COUNCIL**

**ANNUAL REPORT  
OF THE  
MEDICAL OFFICER OF HEALTH**



**FOR THE YEAR**

**1965**



MELTON MOWBRAY  
URBAN DISTRICT COUNCIL

Chairman:

Mr. F.W. Keyworth, J.P.

Vice - Chairman:

Mr. C.R. Towell.

Councillors:

Mr. D.D. Fenley  
Mrs V. Gell  
Mr. F.M. Greaves  
Mr. G.Y.C. Green  
Mr. J.W. Greenslade  
Mr. D.E. Jane  
Mr. T.W. Jones

Mr. J. Littlewood  
Mr. H.J. Mann  
Mr. J.E. Porter  
Mrs M.J. Shouler  
Mr. N.W. Watts  
Mr. J.E. Wright

PUBLIC HEALTH OFFICERS OF THE AUTHORITY

J.V. Loughlin, M.B., B.Ch., B.A.O. D.P.H.  
Medical Officer of Health.

H. Buxton, M.R.S.H., M.A.P.H.I.  
Chief Public Health Inspector and Meat & Food Inspector.

P.F. Raymond, Public Health Inspector's Diploma.  
Additional Public Health Inspector.

Miss M.E. Vann.  
Clerk.



Mr. Chairman, Ladies and Gentlemen,

I beg to submit to you my Annual Report on the health of the District for the year 1965. This has been compiled in accordance with the instructions of the Minister of Health.

I have pleasure in reporting a satisfactory state of health in the District, and the statistics compare favourably with those for England and Wales.

The population has increased by 490 since the previous year and is now 17,340.

The Birth Rate was slightly less at 21.1 and compares with 18.1 for England and Wales. I am pleased to report that there were no maternal deaths.

The Death Rate has continued its downward trend of the previous decade and is now 8.6 which compares very favourably with 11.5 for England and Wales. The chief causes of death were cardio-vascular lesions or diseases, cancer and pneumonia. One notes that almost three times as many women died from vascular lesions of the nervous system as men, all over the age of 55 years, the majority over the age of 75 years. (The ratio for the previous year was 2:1) On the other hand, all deaths from lung cancer were male, remembering that lungs are common to both sexes but subject to more abuse in men. Deaths from pneumonia increased from 7 in 1964 to 12 in 1965, all over the age of 55 years.

The increase in the notification of infectious diseases was mainly due to measles. Measles epidemics have shown a tendency to fluctuate, being greatest during alternate years. It is hoped that with the advent of a suitable measles vaccine, this prevalent and sometimes serious infectious disease will disappear from our midst. As elsewhere, scarlet fever notifications have shown a tendency to increase, the figures for this District, although small, were doubled.

We were reminded of the ever presence of tuberculosis - there were 6 notifications, an increase of 3 - and one death. I wish to remind parents that all school children of 13 years are offered vaccination against tuberculosis. My report shows that in the towns High Schools where I, in fact, carried out the skin testing and vaccination, the acceptance rate varied from 81% to 86%. Whilst this response was good, one must aim for 100% acceptance. This reflects the insatiable need for more and better health education, because not only is prevention better than cure it is also more economical. This knowledge should, of course, permeate all our planning of the health services, but does it?



Your Chief Public Health Inspector has covered the field of environmental hygiene most thoroughly in the latter part of this report so I will content myself with the following comments:-

While the sewer system within the District is satisfactory, the sewage disposal works will require expansion in the immediate years ahead.

A much desired amenity was added to the town's many other, during the year, with the completion of the new Waterfield Swimming Bath.

I have enjoyed the full co-operation of Mr. H. Buxton, Chief Public Health Inspector and I express my thanks both to him and the other members of the staff for their willing and efficient assistance. May I also express my gratitude to the staff of the other departments and to the Council Members for their help and encouragement during the year.

I am, Ladies and Gentlemen,

J.V. Loughlin.

District Medical Officer of Health.

## GENERAL STATISTICS

Area (in acres) - - - - -	5,699
Registrar General's Estimate of Population (Mid. 1965) - - - - -	17,340
Number of inhabited houses - - - - -	5,713
Rateable value - - - - -	£695,386
Product of a penny rate - - - - -	£2,834

### Population

The Registrar General's estimate of the changes in population during the past ten years:-

1956.....	14,520	1961.....	15,900
1957.....	14,860	1962.....	15,980
1958.....	14,860	1963.....	16,310
1959.....	14,870	1964.....	16,850
1960.....	15,090	1965.....	17,340

### BIRTHS

		<u>Rate for District</u>	<u>Rate for England and Wales</u>
Number of live births	373	21.1	18.1
Number of still births	7	18.4	15.8

### DEATHS (all ages)

Number	176	8.6	11.5
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### DEATHS (Infants under 1 year)

Number	7	16.0	19.0
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## VITAL STATISTICS

### Relating to Mothers and Infants

#### Live Births

Number.....	373
Rate per 1,000 population.....	21.08

Illegitimate live births (per cent of total live births)... 3.75

#### Still Births

Number.....	7
Rate per 1,000 total live and still births.....	18.42

Total live and still births..... 380

Infant deaths (deaths under one year)..... 7

#### Infant Mortality Rates

Total infant deaths per 1,000 total live births..... 18.77

Legitimate infant deaths per 1,000 legitimate live  
births..... 19.50

Illegitimate infant deaths per 1,000 illegitimate  
live births..... NIL

Neo-natal Mortality Rate (deaths under 4 weeks per 1,000  
total live births)..... 13.40

Early Neo-natal Mortality Rate (deaths under 1 week per 1,000  
total live births)..... 13.40

Perinatal Mortality Rate (still births and deaths under 1 week  
combined per 1,000 total live and still births) 31.58

#### Maternal Mortality (including abortion)

Number of deaths.....	NIL
Rate per 1,000 total live and still births.....	NIL



## BIRTHS

Total live births and birth rates for the past ten years:-

Year	Total Live Births	Birth Rates per 1,000 population	
		Melton Mowbray	England & Wales
1956	247	16.7	15.7
1957	260	17.1	16.1
1958	234	15.4	16.4
1959	259	17.1	16.5
1960	278	18.1	17.1
1961	296	17.9	17.4
1962	302	18.1	18.0
1963	331	19.9	18.2
1964	387	22.5	18.4
1965	373	21.1	18.1

## DEATHS

Total number of deaths and death rates for the past ten years:-

Year	Total Deaths	Death Rates (per 1,000 population)	
		Melton Mowbray	England & Wales
1956	144	11.2	11.7
1957	152	11.4	11.5
1958	160	11.2	11.7
1959	169	11.5	11.6
1960	205	13.6	11.5
1961	178	10.2	12.0
1962	182	10.9	11.9
1963	195	10.0	12.2
1964	215	10.8	11.3
1965	176	8.6	11.5

Deaths of infants under one year and infant mortality for the past ten years:-

Year	Total Infant Deaths	Infant Mortality Rates per 1,000 live births	
		Melton Mowbray	England & Wales
1956	9	36.4	23.8
1957	6	23.1	23.0
1958	6	25.6	22.5
1959	8	30.9	22.0
1960	8	28.8	21.7
1961	10	33.8	21.4
1962	7	23.2	20.7
1963	9	27.2	20.9
1964	4	10.1	20.0
1965	7	16.0	19.0

CAUSES OF DEATH

	<u>Males</u>	<u>Females</u>	<u>Total</u>
1. Tuberculosis, Respiratory	-	1	1
9. Other Infective and Parasitic Diseases	1	1	2
10. Malignant Neoplasm, Stomach	1	3	4
11. Malignant Neoplasm, Lung, Bronchus	6	-	6
12. Malignant Neoplasm, Breast	-	3	3
13. Malignant Neoplasm, Uterus	-	2	2
14. Other Malignant and Lymphatic Neoplasms	12	8	20
15. Leukaemia, Aleukaemia	1	-	1
16. Diabetes	-	1	1
17. Vascular Lesions of Nervous System	7	20	27
18. Coronary Disease, Angina	13	10	23
19. Hypertension with Heart Disease	3	1	4
20. Other Heart Disease	13	15	28
21. Other Circulatory Disease	2	6	8
23. Pneumonia	5	7	12
24. Bronchitis	3	2	5
26. Ulcer of Stomach and Duodenum	1	-	1
27. Gastritis, Enteritis and Diarrhoea	-	1	1
28. Nephritis and Nephrosis	2	1	3
31. Congenital Malformations	-	1	1
32. Other defined and Ill-defined Diseases	7	12	19
33. Motor Vehicle Accidents	-	1	1
34. All Other Accidents	1	-	1
35. Suicide	2	-	2
Total All Causes	<u>80</u>	<u>96</u>	<u>176</u>

PREVALENCE OF AND CONTROL OVER INFECTIOUS  
AND OTHER DISEASES

Notifiable Disease (other than Tuberculosis) during 1965:-

<u>Disease</u>	<u>Total cases notified</u>
Measles.....	140
Puerperal Pyrexia.....	1
Scarlet Fever.....	10
Erysipelas.....	1
Acute Primary Pneumonia.....	<u>1</u>
	<u>153</u>

ANALYSIS OF CASES OF NOTIFIABLE DISEASES

Disease	Under 1	1 2	3 4	5 9	10 14	15 24	25 34	35 44	45 64	65 & over	Total
Measles	6	23	39	71	-	1	-	-	-	-	140
Puerperal pyrexia	-	-	-	-	-	-	1	-	-	-	1
Scarlet Fever	-	1	2	5	1	1	-	-	-	-	10
Erysipelas	-	-	-	-	-	-	-	-	-	1	1
Acute Primary Pneumonia	-	-	-	-	-	-	1	-	-	-	1
	6	24	41	76	1	2	2	-	-	1	153

TUBERCULOSIS

Age Groups	New Cases			
	Pulmonary		Non-Pulmonary	
	M	F	M	F
Under 5 years	-	-	-	-
5 - 14 "	1	1	-	-
15 - 24 "	1	-	1	-
25 - 44 "	1	-	-	-
45 - 64 "	-	-	-	-
65 and over	1	-	-	-
TOTAL	4	1	1	-



## VACCINATION AND IMMUNISATION PROCEDURES

The following immunisation/vaccination procedures were carried out during the year by Medical Practitioners:-

Diphtheria, Whooping Cough, Tetanus, Poliomyelitis and Smallpox.

In my capacity as School Medical Officer I carried out B.C.G. vaccination (against Tuberculosis) of 13 year old school children. The following are the related figures available:-

	No. of children eligible	No. who consented	No. skin tested	No. positive	No. negative	No. vaccinated
Melton Mowbray Grammar School	318	273	256	39	217	217
Ferneley High School	199	161	146	22	124	122
Sarson High School	291	241	236	30	185	183

B.C.G. vaccination, for other age groups, is available at the Chest Clinics in the County, at the discretion of the Consultant Chest Physician.

Ambulance Facilities: House Nursing Service: Home Help Service:  
Maternity and Child Welfare: School Health Services: Child Life  
Protection:

The Leicestershire County Council is the responsible authority for administration of these services.

### LABORATORY FACILITIES

The following examinations have been carried out at the Public Health Laboratory, Leicester:-

Nose & Throat Swabs.....	23
Faeces & Urine.....	17
Blood.....	1
Sputum.....	24
Milk.....	1
Water.....	8
Ice-Cream.....	8
	<u>82</u>



## SANITARY CIRCUMSTANCES OF THE AREA

I am indebted to Mr. H. Buxton, Chief Public Health Inspector, for the following information:

### WATER SUPPLY

The water undertaking is under the control of the City of Leicester, and the supply has been satisfactory as regards quantity and quality.

Eight samples of mains water supplies taken for bacteriological examination were reported as satisfactory.

There is no indication of any tendency to plumbo-solvent action in the piped supplies.

Except for a small number of isolated premises the dwellinghouses have an internal mains water supply.

### SEWERAGE AND SEWAGE DISPOSAL

The sewer system within the area is satisfactory and can be expanded as and when required. This will involve the laying of new or enlarging existing outfalls.

The sewage disposal works are at present working to maximum capacity, and a large expansion scheme has been prepared which will shortly be submitted to the Ministry for loan sanction.

### REFUSE COLLECTION AND DISPOSAL

The Cleansing Department is under the control of the Engineer and Surveyor.

House and trade refuse is collected by direct labour for disposal at the Controlled tip, and a regular weekly collection of house and trade refuse is in operation.

### SANITARY INSPECTION OF THE AREA

Total number of complaints received.....	187
Number of premises at which defects or nuisances were dealt with.....	260

### VISITS AND INSPECTIONS

Animal Keeping.....	6
Bakehouses.....	6
Dairies.....	12
Drainage works.....	45
Dwellinghouses (all purposes).....	345
Infectious disease inquiries.....	20
Food premises.....	95
Rodent control.....	275
Shops and Offices.....	102
Abattoir and meat inspection.....	620
Caravans.....	20
Factories and workplaces.....	25
Other inspections.....	79
	<u>1,650</u>

## Notices

	<u>Housing</u>	<u>Public Health</u>
<u>Informal</u>		
Outstanding on 1st January.....	2	-
Issued during year.....	12	10
Complied with during year.....	11	10
Outstanding 31st December.....	3	-
<u>Statutory</u>		
Outstanding on 1st January.....	6	-
Issued during year.....	-	-
Complied with during year.....	6	-
Outstanding 31st December.....	-	-

## SWIMMING BATHS AND POOLS

One children's open air paddling pool, owned by the Town Estate, where the water is treated by Chlorination.

The new Waterfield Swimming Bath has been completed and was officially opened on 8th May, 1965.

## THE PET ANIMALS ACT, 1951

Two premises are licensed under the Act.

The conditions are satisfactory and no contraventions were found.

## RODENT CONTROL

Sections of the main sewers in the district have been test baited and treatments carried out to deal with rat infestations.

106 minor rats or mice infestations, reported or discovered, have been dealt with and surveys carried out in conjunction with these infestations.

## MOVEABLE DWELLINGS

### Caravan Sites & Control of Development Act, 1960

No new site licenses were issued during the year.

There is one privately owned licensed site for a maximum of 20 vans, and 2 individual vans which are subject to temporary permission.

Several vans have had to be moved from unlicensed sites.



OFFICES, SHOPS and RAILWAY PREMISES ACT, 1963

Class of premises	Number registered	Number of inspections	Contraventions		
			Found	Remedied	Outstanding 31.12.65
Offices.....	54	22	12	3	9
Retail Shops.....	110	66	40	10	30
Wholesale Shops, warehouses.....	8	4	3	1	2
Catering estabs. open to the public, canteens.....	19	8	6	2	4
Fuel Storage depots	3	2	1	-	1
TOTALS	194	102	62	16	46

Three accidents reported, at retail shops, were all of a minor nature.

The majority of the outstanding contraventions are concerned with the provision of thermometers and suitable first aid equipment.

Analysis of persons employed in registered premises by workplace

Class of workplace	No. of persons employed
Offices	817
Retail shops	647
Wholesale department, warehouses	124
Catering establishments open to the public	134
Canteens	18
Fuel storage depots	17
Total	1,757
Total Males	876
Total Females	881

## HOUSING

### HOUSING IN CLEARANCE AREAS AND UNFIT HOUSES ELSEWHERE

#### A. HOUSES DEMOLISHED

<u>In Clearance Areas</u>	<u>Houses Demolished</u>	<u>Displaced During Year</u>	
		<u>Persons</u>	<u>Families</u>
Houses unfit for human habitation	9	10	3
Houses included by reason of bad arrangement etc.	-	-	-
Houses on land acquired under Section 43 (2) Housing Act, 1957	3	-	-
<u>Not in Clearance Areas</u>			
As a result of formal or informal procedure under Section 17 (1) Housing Act, 1957.	2	-	-
Local Authority owned houses certified unfit by the Medical Officer of Health.	-	-	-
Houses unfit for human habitation where action has been taken under local Acts.	-	-	-
Unfit houses included in Unfitness Orders.	-	-	-

#### B. UNFIT HOUSES CLOSED      NIL

#### C. UNFIT HOUSES MADE FIT & HOUSES IN WHICH DEFECTS WERE REMEDIED

	<u>By Owner</u>	<u>By Local Authority</u>
After informal action by local authority.	10	-
After formal notice under		
(a) Public Health Act	-	-
(b) Sections 9 and 16 Housing Act, 1957.	-	-
Under Section 24 Housing Act, 1957.	-	-

#### D. UNFIT HOUSES IN TEMPORARY USE (Housing Act, 1957)      NIL

#### E. PURCHASE OF HOUSES BY AGREEMENT

<u>Houses in Clearance Areas other than those included in Confirmed Clearance Orders or Compulsory Purchase Orders purchased in the year.</u>	<u>Number of houses</u>	<u>Number of occupants</u>
	7	21



Rent Act, 1957. Certificates of Disrepair.

No applications for Certificates of Disrepair were received during the year.

<u>New Houses:</u>	<u>By Local Authority</u>	<u>By Private Enterprise</u>
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Number of houses completed during the year.....	-	199
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Number of houses in course of erection at the end of the year.....	33	143
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Total number of post-war houses completed..	1,097	1,609
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Occupied Houses:

Total number of occupied houses in district..... 5,713

Number of council houses occupied..... 1,326

Improvement Grants. Housing (Financial Provisions) Act, 1958

- (1) No. of applications for grants received during the year..... 1
  - (a) from owner/occupiers..... 1
  - (b) from owners of rented property..... -
- (2) No. of applications approved..... 1
- (3) No. of applications refused..... -

House Purchase and Housing Act, 1959

- (1) No. of applications received for standard grants from:-
  - (a) Owner/Occupiers..... 17
  - (b) Owners of rented property..... 5
- (2) No. of applications approved..... 22
- (3) No. of properties improved during the year..... 12

Housing Applications

Details of applications on the Register at 31st December, 1965

<u>Date of Application</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>Totals</u>
Residing in the Urban District	4	2	8	40	93	147
Residing outside the District	11	4	13	46	84	158
	15	6	21	86	177	305

Applications for elderly peoples dwelling, small accommodation and bungalow type:-

For couples	48	
For single person	91	Total 139

# INSPECTION AND SUPERVISION OF FOOD

## Milk Supply

### Dairies (other than Dairy Farms) and Distributors

	<u>No. on</u> <u>Register</u>	<u>No. of</u> <u>Inspections</u>
Dairies.....	4	6
Distributors only.....	8	6

No contraventions found.

## Ice-Cream

Number of premises registered:

- (a) Manufacture and Retail..... NIL
- (b) Manufacture only..... NIL
- (c) Retail only..... 59

Inspections of the registered premises and vehicles used for the sale of ice-cream were made during the year, and were found satisfactory. Most of the ice-cream is now sold ready packed.

8 Samples of ice-cream were all satisfactory.

## Food Poisoning

No cases of food poisoning have been notified during the year.

## Meat and Other Foods

All animals slaughtered at the abattoir have been inspected and marked in accordance with the provisions of the Meat Inspection Regulations, 1963.

Number of slaughterhouses in area.....	1
Number of animals slaughtered and inspected.....	16,450
Number of visits to slaughterhouse.....	620
Number of knackers yards in area.....	1
Number of visits to knackers yard.....	5
Number of licensed slaughtermen.....	14
Licenses issued during the year:	
(a) new licenses.....	-
(b) renewals.....	14

	<u>No. of visits</u>
Meat shops, meat stores, etc.....	12
Places where food (other than meat) is kept or prepared for sale.....	50

The following foods were condemned and voluntarily surrendered during the year:-

9 boxes of imported grapes (90 lbs) 731 packets of frozen foods;  
315 tins of various food. No. of certificates issued 81.



Carcases Inspected and Condemned

	Cattle excluding Cows	Cows	Calves	Sheep and Lambs	Pigs	Total
Number killed	1,734	45	23	7,307	7,341	16,450
<u>All Diseases except Tuberculosis</u>						Wt. in lbs
Whole carcasses condemned	-	1	-	21	9	2,372
Carcase of which some part or organ condemned	340	9	7	77	680	6,024
Percentage of number inspected affected with disease other than Tuberculosis.	19.6%	22.2%	30.4%	1.3%	9.4%	
<u>Tuberculosis only</u>						
Whole carcasses condemned	-	-	-	-	-	-
Carcases of which some part or organ condemned	1	-	-	-	52	632
Percentage of number inspected affected with Tuberculosis	0.06%	-	-	-	0.71%	
<u>Cysticercosis</u>						
Carcases of which some part or organ condemned.	2	-	-	-	-	71

Total weight in lbs. 9,099

4 tons. 1 cwt. 27 lbs of meat was condemned during the year, compared with 4 tons. 2 cwts. 6 lbs. last year.

FOOD HYGIENE (GENERAL) REGULATIONS, 1960

The following table shows the number of food premises grouped in categories of trade carried on and includes information regarding compliance with Regulations 16 and 19 concerning washing facilities.

Trade	No.	No. complying with Reg.16	No. to which Reg.19 applies	No. complying with Reg.19
Grocer	42	42	11	11
Greengrocer	9	9	9	9
Fried fish	6	6	6	6
Wet fish	2	2	2	2
Butcher	15	15	15	15
Confectioner	21	21	4	4
Cafes and canteens	14	14	14	14
Licensed premises and restaurants	33	33	33	33



Prescribed Particulars on the Administration  
of the Factories Act, 1961

1. Inspection for purposes of provisions as to health:

	<u>No. on</u> <u>Register</u>	<u>Inspec-</u> <u>tions</u>	<u>Written</u> <u>Notices</u>	<u>Occupiers</u> <u>Prosecuted</u>
(i) Factories in which Sections 1,2,3,4 and 6 are to be enforced by Local Authorities.	20	5	-	-
(ii) Factories not included in (i) in which section 7 is enforced by Local Authorities.	85	15	-	-
(iii) Other premises in which Section 7 is enforced by Local Authorities.	5	5	-	-
	<u>110</u>	<u>25</u>	<u>-</u>	<u>-</u>

2. Cases in which defects were found:

	<u>Found</u>	<u>Remedied</u>	<u>Referred</u> <u>to H.M.</u> <u>Inspector</u>	<u>by H.M.</u> <u>Inspector</u>
Want of cleanliness	-	-	-	-
Overcrowding	-	-	-	-
Unreasonable temperature	-	-	-	-
Inadequate ventilation	-	-	-	-
Ineffective drainage of floors	-	-	-	-
Sanitary Conveniences				
(a) insufficient	-	-	-	-
(b) unsuitable or defective	3	3	-	-
(c) Not separate for sexes	-	-	-	-
Other offences against the Act	-	-	-	-

Outwork

No. of outworkers..... 20

Nature of work..... Making etc. of wearing apparel.

There was no instances of outwork in wholesome premises.

# THE UNIVERSITY OF CHICAGO DEPARTMENT OF CHEMISTRY

EXPERIMENTAL PROCEDURE			
1. Preparation of the sample	2. Measurement of the initial rate	3. Measurement of the final rate	4. Calculation of the rate constant
1.1 Weigh out 0.1 g of the solid sample	2.1 Measure the initial rate by recording the volume of gas evolved in the first 10 minutes	3.1 Measure the final rate by recording the volume of gas evolved in the last 10 minutes	4.1 Calculate the rate constant $k$ from the initial and final rates
1.2 Dissolve the sample in 10 ml of water	2.2 Measure the initial rate by recording the volume of gas evolved in the first 10 minutes	3.2 Measure the final rate by recording the volume of gas evolved in the last 10 minutes	4.2 Calculate the rate constant $k$ from the initial and final rates
1.3 Dissolve the sample in 10 ml of 0.1 M HCl	2.3 Measure the initial rate by recording the volume of gas evolved in the first 10 minutes	3.3 Measure the final rate by recording the volume of gas evolved in the last 10 minutes	4.3 Calculate the rate constant $k$ from the initial and final rates
1.4 Dissolve the sample in 10 ml of 0.1 M H <sub>2</sub> SO <sub>4</sub>	2.4 Measure the initial rate by recording the volume of gas evolved in the first 10 minutes	3.4 Measure the final rate by recording the volume of gas evolved in the last 10 minutes	4.4 Calculate the rate constant $k$ from the initial and final rates

## RESULTS AND DISCUSSION

Experiment	Initial Rate (ml/min)	Final Rate (ml/min)	Rate Constant $k$ (min <sup>-1</sup> )
1.1	0.12	0.08	0.02
1.2	0.15	0.10	0.025
1.3	0.18	0.12	0.03
1.4	0.20	0.14	0.035

The results of the experiment show that the rate constant  $k$  increases with the concentration of the acid. This is expected since the reaction is first order with respect to the acid concentration. The rate constant  $k$  is calculated from the initial and final rates using the equation  $k = \frac{\ln(R_i/R_f)}{t}$ , where  $R_i$  is the initial rate,  $R_f$  is the final rate, and  $t$  is the time interval between the two measurements.



